

Agricultural Water Use and Conservation

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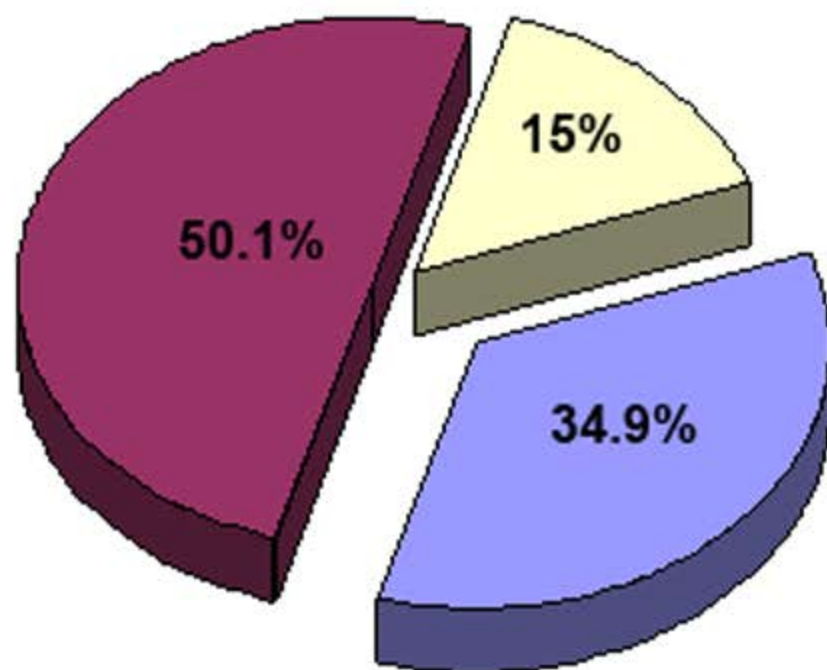
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Overview

- ❑ *On-farm agricultural production only, not product processing.*
- ❑ *Agriculture water uses and factors impacting the largest use.*
- ❑ *What can existing water and energy conservation practices do?*

Total Groundwater Pumping

~ 2008 ~



■ Agriculture

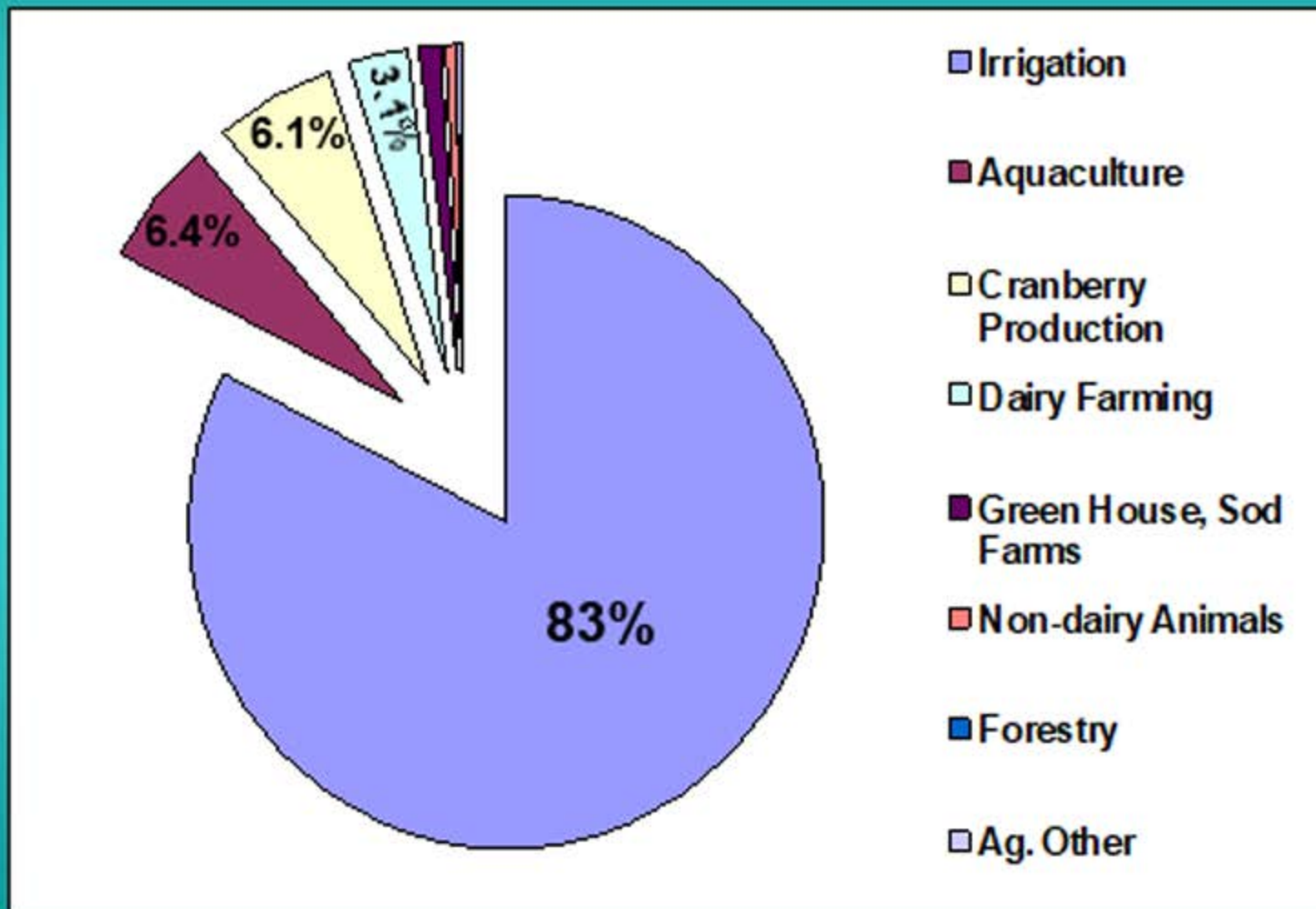
■ Municipal

■ Other

Source: WDNR Bureau of Drinking Water and Groundwater and WI Public Service Commission

Agricultural Groundwater Pumping

~ 2008 ~



Source: WDNR Bureau of Drinking Water and Groundwater

Factors Impacting Irrigation Water Use

- ☐ *Climate (temperature and humidity).*
- ☐ *Soil type (texture).*
- ☐ *Crop type (root depth, drought resistance).*
- ☐ *Irrigation equipment and operation.*

Factors Impacting Irrigation Water Use

~ Climate ~

❑ Water Input:

Precipitation, includes both rainfall and snowmelt.

❑ Water Losses:

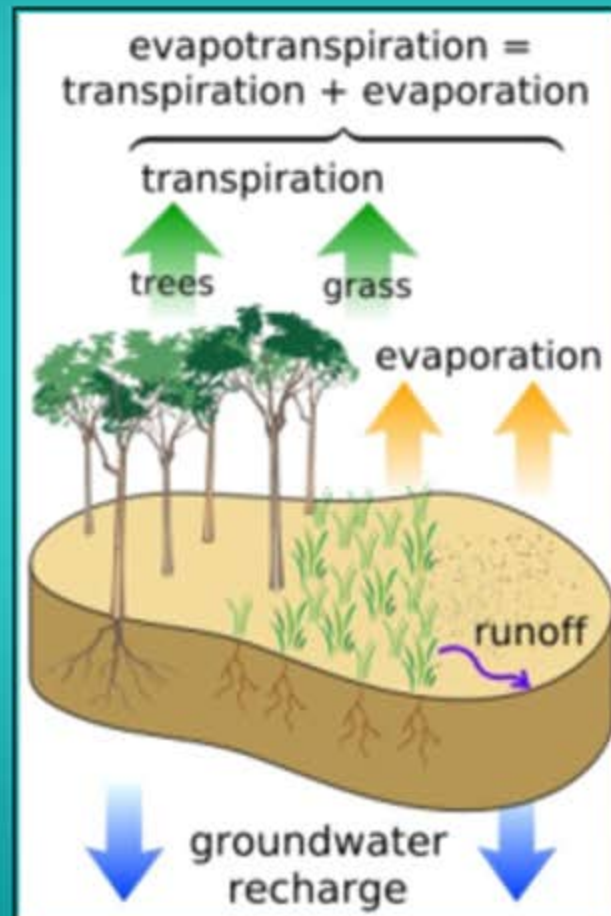
Evapotranspiration (evaporation and plant transpiration) & drainage.

❑ Management Issue:

Spatial and temporal distribution.

❑ Climate Change:

Intense rainfall, spatial variability.



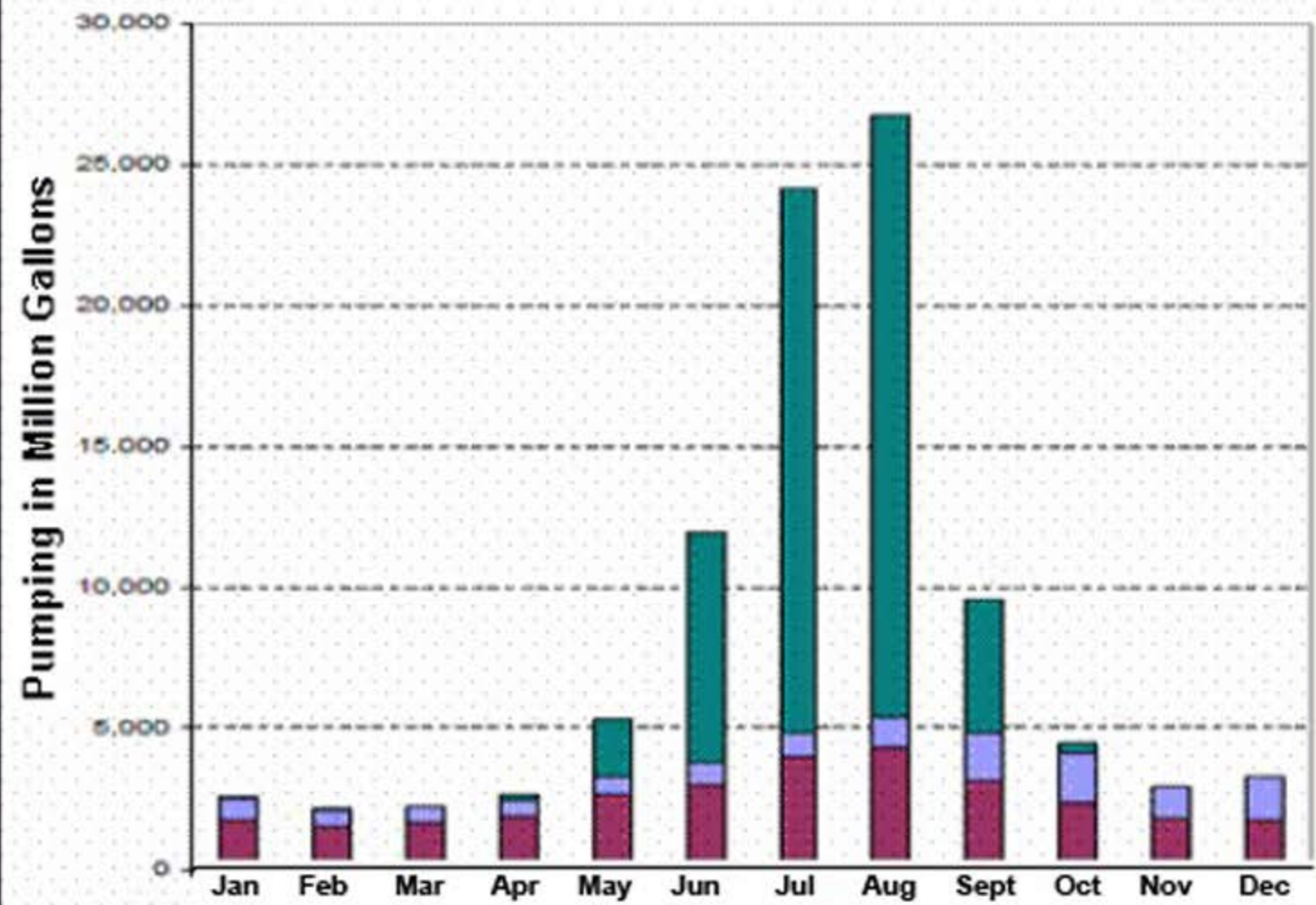
Factors Impacting Irrigation Water Use

~ Climate ~

<i>Crop</i>	<i>Total ET (inches)</i>	<i>Typical Seasonal Irrigation (inches)</i>
<i>Alfalfa</i>	<i>20-22</i>	<i>10-14 (50-64%)</i>
<i>Corn</i>	<i>14-16</i>	<i>10-14 (71-88%)</i>
<i>Soybeans</i>	<i>14-16</i>	<i>8-12 (57-75%)</i>
<i>Average Annual Precipitation = 30 to 34 inches</i>		

Source: Midwest Plan Service Sprinkler Irrigation Systems Manual, MWPS 30.

Groundwater Pumping by Month



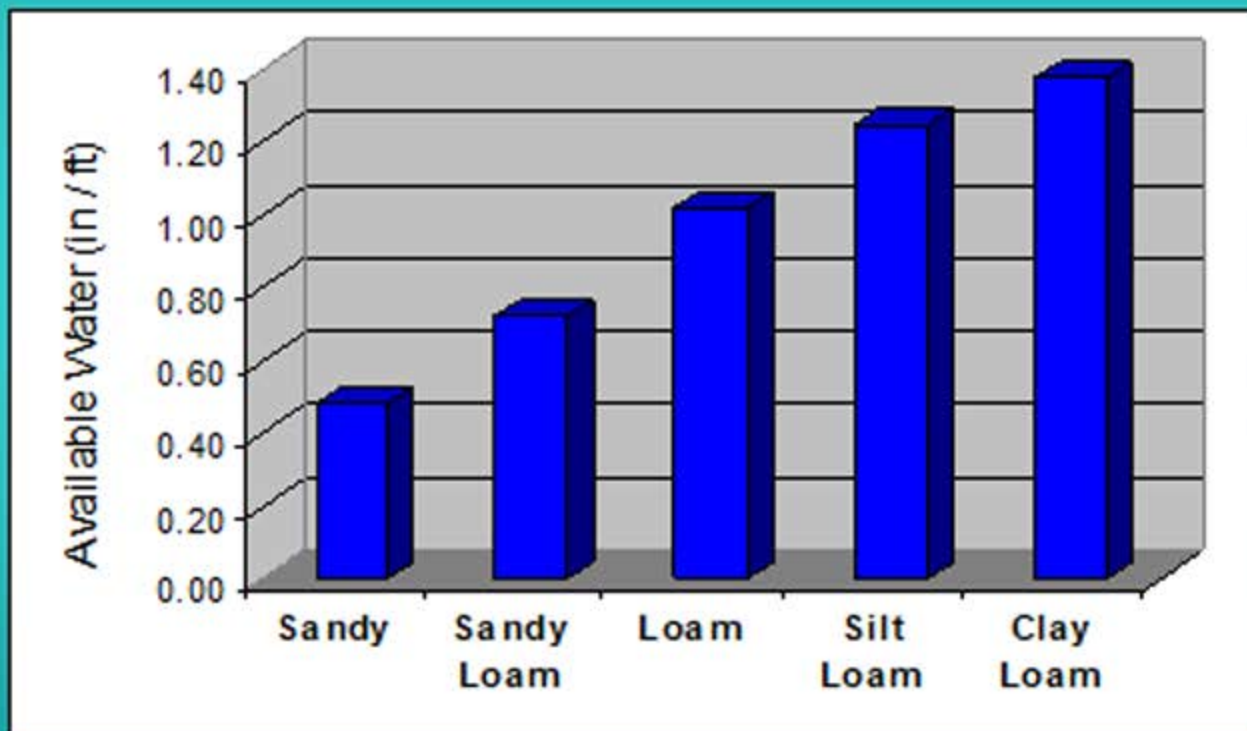
■ Non-agricultural ■ Agricultural Non-irrigation ■ Agricultural Irrigation

Source: WDNR Bureau of Drinking Water and Groundwater

Factors Impacting Irrigation Water Use

~ Soils ~

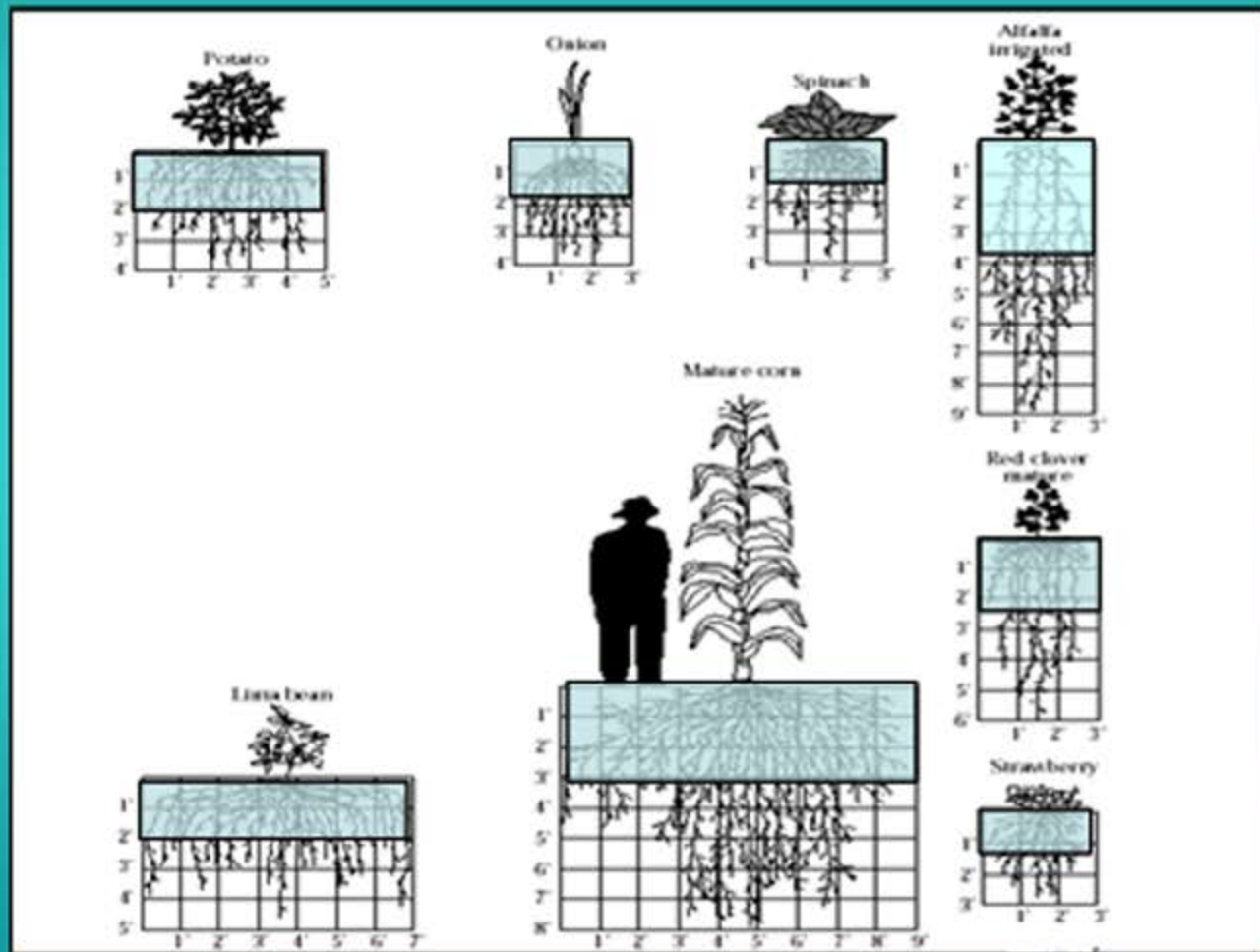
Different soils retain different amounts of water



Silt loam holds 2.6 times more water than a sandy soil

Factors Impacting Irrigation Water Use

~ Crop Type ~



Factors Impacting Irrigation Water Use

~ Equipment and Operation ~

***Water Application Efficiency =
Water Stored in Soil / Total Water Applied***

***Preferred irrigation
system throughout
WI:***

Center Pivot

***Application
efficiency***

~ 85 - 90%

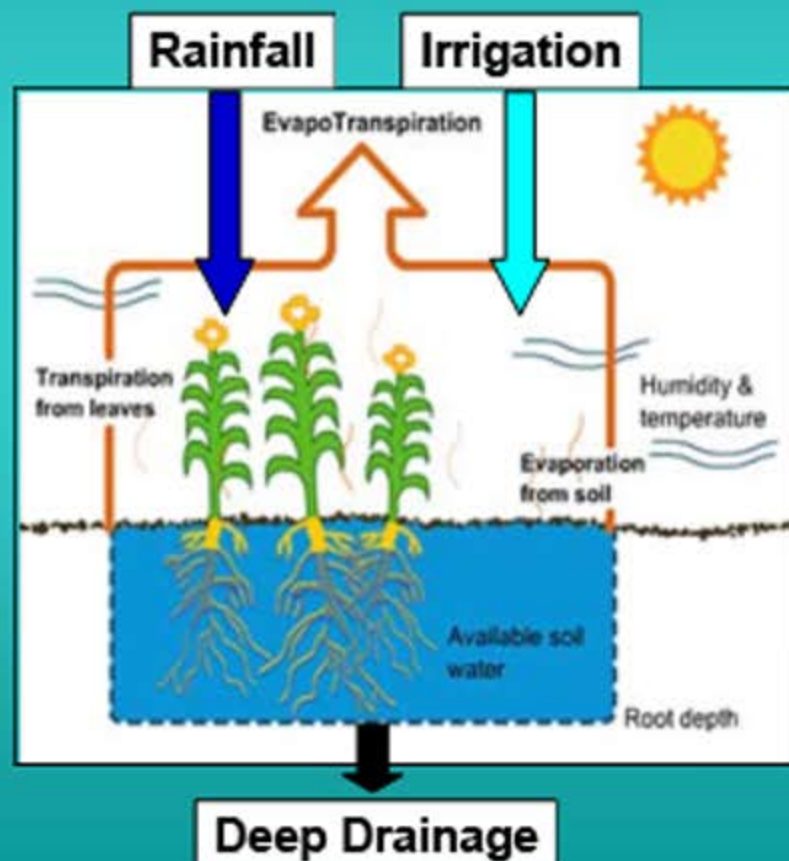


Factors Impacting Irrigation Water Use

~ Equipment and Operation ~

Irrigation Scheduling

- ☐ **Daily root zone balance of water inputs and outputs.**
- ☐ **Only irrigate when soil moisture is low.**
- ☐ **Reduce deep drainage from over irrigating.**

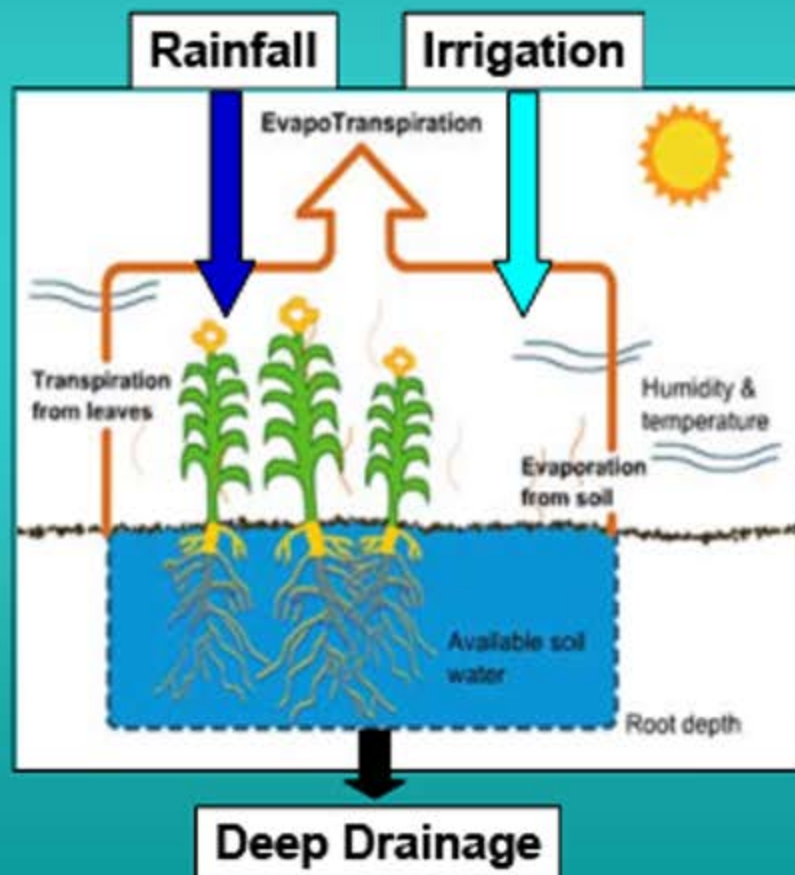


Factors Impacting Irrigation Water Use

~ Equipment and Operation ~

Irrigation Scheduling

- ☐ ET data are available for all of WI via UW – Soils web site.
- ☐ Scheduling software available from UWEX.
- ☐ Conserve GW by better using rainfall.
- ☐ Water conserved is about 10 to 15%.



Factors Impacting Irrigation Water Use

~ Equipment and Operation ~

Uniformity Testing

- ☐ ***For systems more than 5 years old.***
- ☐ ***Inspect system for leaks and pump malfunctions.***
- ☐ ***Test for uniform spray distribution.***
- ☐ ***UWEX provides equipment and training for testing.***

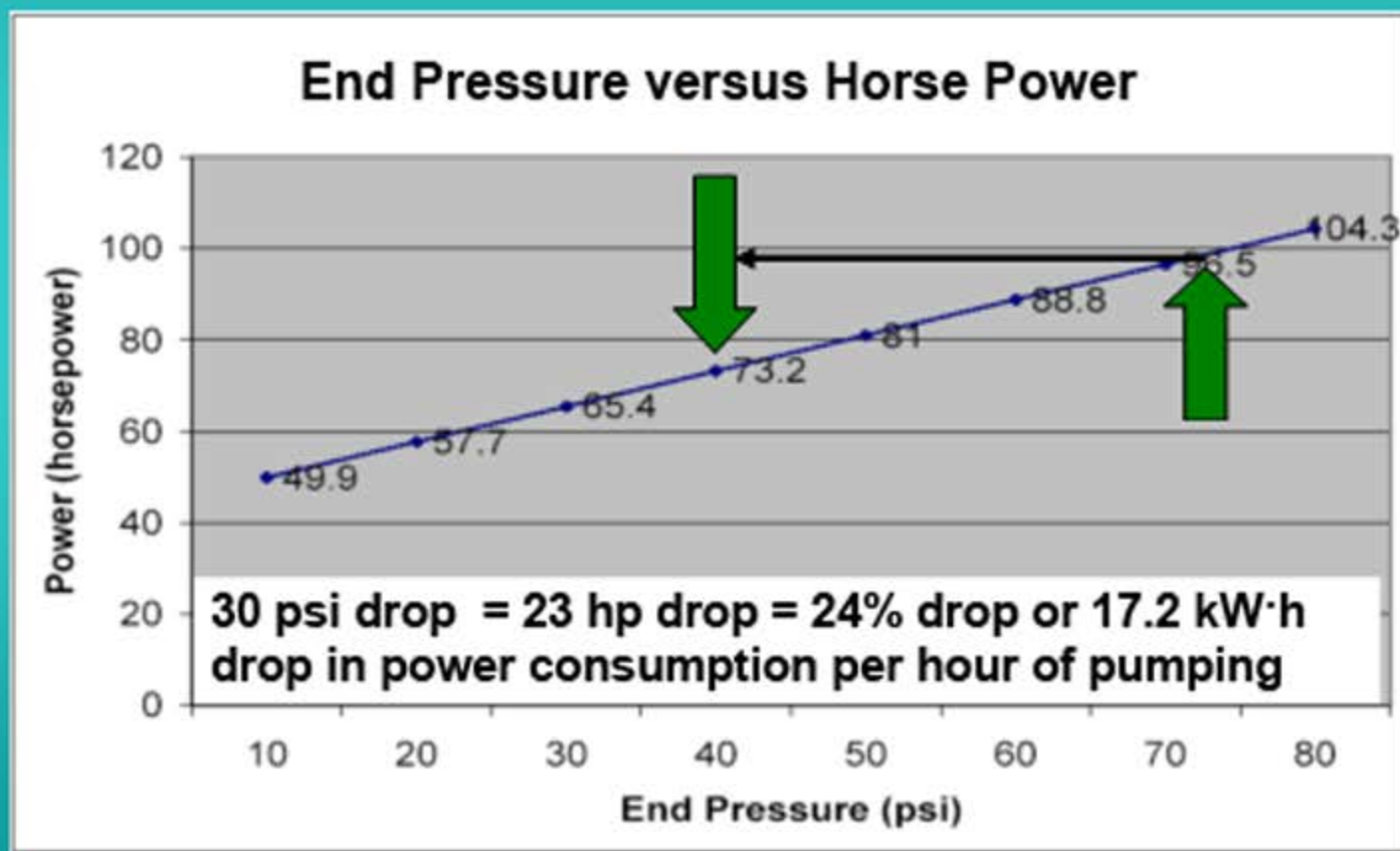


Source: Scott Sanford, Biological Systems Engineering Dept. & Focus on Energy

Factors Impacting Irrigation Water Use

~ Equipment and Operation ~

Convert System to Low Pressure



Source: Scott Sanford, Biological Systems Engineering Dept. & Focus on Energy

Conclusions

- ☐ *Irrigation is the largest agricultural groundwater use.*
- ☐ *Seasonal irrigation equals about 8 - 14 inches of water or about 70% of ET.*
- ☐ *Irrigation scheduling can reduce seasonal water use 10 to 15%.*
- ☐ *The number of producers currently scheduling their irrigation is not clear.*

Conclusions

- ☐ *Reducing irrigation system operating pressure by 30 psi can save 413 kW per day of pumping.*
- ☐ *Informational resources are currently available from UWEX for irrigation scheduling, uniformity testing and pressure reduction.*
- ☐ *Irrigation water conservation alone will not restore dry creeks, but can enhance other measures.*